Modular RadialHeat Oud Heating Ecosystem
Public Disclosure Document - Rev-E
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0. Executive Summary

The Modular RadialHeat Oud Heating Ecosystem is a novel, eco-friendly system for volatilizing oud (agarwood) chips using annular charcoal rings (coconut, clean Kōdō coals, or self-igniting cartridges; 180–280°C), delivering pure, Kōdō-style to intense aromas (4.0–4.5/5 sensory score, -32% PAH vs. direct coal). It addresses oud waste in Bukhoor burners by isolating the payload on a mica plate, heated radially ($\sigma < \pm 10$°C). Invention 4 (Suspension Ring Module) features a perforated ceramic ring (aluminum alternative) with model-specific fixed mica placements:

- **Kōdō Model**: 0.3 mm below top, 0.3 mm borders, ~95–98% vapor release, pure aroma (U.S./UAE spas, Kōdō coals).
- **Majlis Model**: 7.5 mm depth, 5–7.5 mm borders, ~85–90% release, intense aroma (Saudi Arabia/Russia, self-igniting cartridges).
- Others (Balanced, Intense, Niche) for varied GCC needs.

COGS $0.64–$0.74 (ceramic ring), retail $10 (89–90% margin), 60% CO_2 reduction (coconut). Patents planned for U.S., Saudi Arabia, UAE/GCC, Russia by November 14, 2025 (urgent due to disclosure).
Visual Aid: [Infographic: Perforated ceramic ring, upper chimney (mica fixed at 0.3 mm, 4 mm, 7.5 mm, 11 mm, or 13.5 mm; 0.3–12 mm borders), lower holder (coconut/Kōdō/self-igniting coal), oud glued, radial heat. Caption: “Versatile Coal and Aroma Optimization.”]

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1. Problem Statement

Traditional oud heating (e.g., Bukhoor burners, hookah coals) wastes agarwood ($100–$1000/g), produces smoky off-notes (PAH emissions), and lacks temperature control (>350°C). Kōdō rituals require pure aromas (4.0+/5), unmet by electric or ash-bed heaters. Spa/majlis users in U.S., Saudi Arabia, UAE/GCC, Russia, and Japan demand eco-friendly, portable, and aesthetic solutions with flexible coal options (coconut, Kōdō, self-igniting).

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2. Ring-Coal Standard

The system uses annular charcoal rings (inner Ø 20 ± 0.2 mm, ISO 13571 ventilation warning):

- **Coconut Charcoal** (≥90% coconut, food-contact compliant):
  - **Gentle**: Outer Ø 30 mm, height ~12 mm, 205 ± 10°C, 38 min burn.
  - **Table**: Outer Ø 40 mm, height 15 mm, 222 ± 8°C, 47 min burn.
  - **Arabic**: Outer Ø 50 mm, height ~18 mm, 240 ± 10°C, 54 min burn.
- **Clean Kōdō Coals** (bamboo/paulownia-based, low-ash, near-zero PAH):
  - Same dimensions (Ø 30/40/50 mm, height 12–18 mm), 200–230°C, 35–50 min burn, 4.4–4.5/5 purity (Proto B pending).
- **Self-Igniting Coals in Cartridges** (coconut-based, food-safe ignition layer):
  - Small: Ø 19.8 × H 8 mm (Invention 3); Large: Ø 30/40/50 mm, height 12–18 mm, 205–245°C, 25–40 min burn, 4.3/5 purity.

Inner void (20 mm) receives a mica plate (Ø 19.8 mm) for oud (0.15 g), isolating it from combustion gases.

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3. Invention 1 - Annular Heat Source

Purpose: Standardizes annular charcoal (coconut, Kōdō, or self-igniting) for radial heat (180–280°C), preventing direct gas contact.
Specs: Coconut (≥90%), Kōdō (bamboo/paulownia), or self-igniting (coconut with ignition layer), dimensions as above, food-contact compliant.
Performance: 180–280°C for ≥25 min, σ < ±10°C, -30% PAH (coconut/self-igniting), near-zero PAH (Kōdō, Proto B pending).
Advantages: Eco-friendly (coconut), premium purity (Kōdō), convenient (self-igniting).

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4. Invention 2 - Integrated Heat-Plate Ring

Purpose: Mica plate holds oud, naturally glued or pinned, for radial heating with any coal type.
Specs:

- **Mica Plate**: Ø 19.8 mm, 1.5–2 mm thick, λ = 0.8 W/m·K, borders Ø 20.0 ± 0.05 mm (model-specific, see Invention 4).
- **Oud Chip**: 0.15 g, glued via resin release (180–200°C, no synthetic adhesives) or pinned (titanium GR2, Ø 1.0 mm, 4–6 mm high).
- **Operation**: Place oud on mica, insert into coal's void, heat to glue (~1 min) or pin. **Performance**: Stable resin bond at 222 ± 8°C, 10 cycles, 4.3–4.5/5 aroma purity (Kōdō coals higher, Proto B pending).

Advantages: Isolates oud, reduces waste, compatible with coconut/Kōdō/self-igniting coals.

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5. Invention 3 - Self-Igniting Oud Cartridge

Purpose: Pre-assembled cartridge for radial or vertical heating.
Specs: Ø 19.8 × H 8 mm, coconut charcoal, mica insert (Ø 19.8 mm, 2 mm thick), oud (0.15 g), self-igniting layer (food-safe). Larger annular versions (Ø 30/40/50 mm, height 12–18 mm) match Gentle/Table/Arabic.
Performance: 205–245°C, 25–40 min, 4.3/5 aroma, ~90–95% release.
Advantages: Portable, user-friendly for travel/majlis (Q3-2025 crowdfunding).

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6. Invention 4 - Suspension Ring Module (Support Module)

Purpose: Perforated ring (ceramic, optional aluminum) with dual radii suspends charcoal ring/cartridge (coconut, Kōdō, or self-igniting) ~5 mm, with model-specific fixed mica plate positions for aroma optimization.
Hardware Specs:

- **Body**: Primary: Molded ceramic (alumina); Alternative: CNC-machined aluminum (6061). Dual-radius design:
    - **Upper Chimney**: Inner Ø 20 ± 0.1 mm, fits coal's 20 ± 0.2 mm void and mica (Ø 19.8 mm), fixed depth per model (0.3 mm, 4 mm, 7.5 mm, 11 mm, 13.5 mm).
    - **Lower Coal Holder**: Inner Ø 30.5/40.5/50.5 mm (±0.2 mm), holds coal (Ø 30/40/50 mm), loose fit (+0.5 mm tolerance).
    - Outer Ø 35.5/45.5/55.5 mm, height 5 mm, thickness 0.8 mm, weight ~30 g (ceramic), ~40 g (aluminum).
- **Perforations**: 8–10 holes (Ø 3 mm, evenly spaced) for lateral airflow.
- **Suspension Lips**: Three lips (1 mm high, 120° apart), elevate ~5 mm.
- **Finish**: Ceramic: Matte white (spa), glazed bronze (artisan); Aluminum: Polished/anodized silver/bronze. Food-contact compliant.
- **Compatibility**: Coconut, Kōdō, self-igniting coals (Gentle/Table/Arabic, Invention 3/5 cartridges).

Alignment Mechanism:

- **Mica Plate**: Laser-cut mica (Ø 19.8 mm, 1.5–2 mm thick, λ = 0.8 W/m·K), borders (Ø 20.0 ± 0.05 mm, height per model):
    - **Kōdō Model**: 0.3 mm below top, 0.3 mm borders, 2 mm thick, ~95–98% vapor release (ideal with Kōdō coals).

    - **Balanced Model**: 4 mm depth (~27% height), 3–4 mm borders, 1.5 mm thick, ~90–95% release (coconut/self-igniting).
    - **Majlis Model**: 7.5 mm depth (~50% height), 5–7.5 mm borders, 1.5 mm thick, ~85–90% release (self-igniting/coconut).
    - **Intense Model**: 11 mm depth (~73% height), 7.5–10 mm borders, 1.5 mm thick, ~80–85% release (coconut).
    - **Niche Model**: 13.5 mm depth (~90% height), 10–12 mm borders, 1.5 mm thick, ~75–80% release (coconut).
- **Central Pin**: Titanium GR2 (Ø 1.0 mm, 4–6 mm high, based on border height), optional for gluing.
- **Operation**: Select model; place ring on surface; slot ignited coal (coconut/Kōdō/self-igniting) into lower holder (loose fit); insert mica into upper chimney (1–2 mm centering); add oud chip. Heat to 180–200°C glues chip (1 min). Pin used if gluing skipped.

Performance:

- **Thermal Efficiency**: 5 mm elevation + 8–10 perforations extend Gentle plateau by +4 min (all coals).
- **Radial Heat**:
    - Kōdō: 220°C (25–30 min), ~210°C late (Kōdō/coconut coals).
    - Balanced: 220–225°C (28–33 min), ~215°C late (coconut/self-igniting).
    - Majlis: 220–225°C (30–35 min), ~215°C late (self-igniting/coconut).
    - Intense: 225–230°C (30–35 min), ~210–215°C late (coconut).
    - Niche: 225–230°C (25–30 min), ~200–210°C late (coconut) (Proto B pending).
- **Vapor Release**: Kōdō: ~95–98%; Balanced: ~90–95%; Majlis: ~85–90%; Intense: ~80–85%; Niche: ~75–80% (Proto B pending).
- **Aroma Purity**: Kōdō: 4.3–4.5/5 (Kōdō coals higher); others 4.0–4.4/5 (Proto B pending), -32% PAH (coconut/self-igniting), near-zero PAH (Kōdō).
- **Durability**: Ceramic/Aluminum withstands 280°C, 10 cycles (no cracks).
- **Resin Bond**: Stable at 222 ± 8°C (Table grade, all coals).

Advantages:

- Ceramic: COGS $0.64 (Kōdō), eco-friendly, spa aesthetic for UAE/Saudi.
- Supports coconut (cost-effective), Kōdō coals (premium purity), self-igniting cartridges (convenient).
- Model-specific mica depths optimize Kōdō-style to intense aromas.

Manufacturing:

- Coconut Charcoal: Briquette press, COGS $0.16 (Gentle), $0.18 (Table), $0.20 (Arabic).

- Kōdō Coals: Hand-crafted/pressed, COGS $0.30 (Gentle), $0.35 (Table), $0.40 (Arabic).
- Self-Igniting Cartridges: Molding + blister, COGS $0.95 (3-pack, small); $0.25–$0.35 (large).
- Ceramic (Kōdō, 0.3 mm depth, 0.3 mm borders): Molding $0.50, glazing $0.10, drilling $0.05, mica (2 mm) $0.04; COGS $0.64.
- Ceramic (Balanced, 4 mm, 3–4 mm borders): Molding $0.50, glazing $0.10, drilling $0.05, mica (1.5 mm) $0.08; COGS $0.68.
- Ceramic (Majlis, 7.5 mm, 5–7.5 mm borders): Molding $0.50, glazing $0.10, drilling $0.05, mica (1.5 mm) $0.10; COGS $0.70.
- Ceramic (Intense, 11 mm, 7.5–10 mm borders): Molding $0.50, glazing $0.10, drilling $0.05, mica (1.5 mm) $0.12; COGS $0.72.
- Ceramic (Niche, 13.5 mm, 10–12 mm borders): Molding $0.50, glazing $0.10, drilling $0.05, mica (1.5 mm) $0.14; COGS $0.74.
- Aluminum: CNC/die-cast $0.65, finishing $0.10, drilling $0.05; COGS $0.79.
- Primary: Ceramic, Kōdō Model, coconut/Kōdō coals, COGS $0.64, retail $10 (90% margin).

Visual Aid: [Diagram: Perforated ceramic ring, upper chimney (mica fixed at 0.3 mm, 4 mm, 7.5 mm, 11 mm, or 13.5 mm; 0.3–12 mm borders), lower holder (coconut/Kōdō/self-igniting coal), oud glued, radial heat. Caption: “Tailored Aroma with Versatile Coals.”]

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7. Invention 5 - Reversible Drop-In Cartridge

Purpose: Reversible cartridge for radial (210°C) or vertical (245°C) heating.
Specs: Lava bead (22% porosity), Ø 19.8 × H 8 mm, coconut charcoal, mica insert, oud (0.15 g). Larger annular versions (Ø 30/40/50 mm, height 12–18 mm) match Gentle/Table/Arabic.
Performance: 210–245°C, 25–40 min, 4.3/5 aroma, ~90–95% release.
Advantages: Aesthetic, portable for majlis/expos (GCC, Q4-2025).

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8. Draft Claim Set

- **Independent Claim**: Annular heat source (coconut charcoal, Kōdō coals, or self-igniting cartridge) dimensioned to receive an insert bearing oxygen-sensitive aromatics, wherein combustion gases are prevented from direct contact.
- **Dependent Claim**: Insert comprises mica, lava, or basalt; includes pin; fixed at 0–93% ring height.
- **Dependent Claim**: Insert maintains 180–280°C for ≥25 min.

- **Dependent Claim**: Heat source comprises ≥90% coconut charcoal, bamboo/paulownia-based Kōdō coals, or self-igniting cartridge.
- **Dependent Claim**: Heat source includes ISO 13571 ventilation warning.
- **System Claim**: Kit with ≥2 ring sizes and reversible cartridge enabling radial/vertical heat vectors.
- **Dependent Claim**: Support module with mica insert having raised borders (0.3–12 mm high), fixed at 0.3 mm below top to 93% ring height per model, aligning within 2 mm of center for radial heat and aroma optimization.
- **Dependent Claim**: Insert of claim 2, wherein oud payload is naturally adhered to mica via resin release at 180–200°C, without synthetic adhesives.
- **Dependent Claim**: Support module of claim 6, comprising a ceramic or metal (e.g., aluminum) ring with dual radii (upper chimney with fixed-depth support for mica, wider lower holder for heat source), with 8–10 perforations (Ø 3 mm) and lips elevating 5–10 mm for airflow.
- **Method Claim**: Select model and coal type, place ring, insert payload, ignite, volatilize aromatics in 30–60 s.
- **Design Claim**: Ornamental glazed (ceramic) or anodized (aluminum) pattern on perforated ring.

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9. Performance-Validation Plan

Test	Metric	Target	Result
Thermal Plateau	σ < ±10°C, 25 min	Pass	Pass (coconut, Gentle/Table)
GC-MS PAH	-30% (coconut/self-igniting), near-zero (Kōdō)	Pass	-32% (coconut)
Sensory Panel (1–5)	≥4	Pass	4.3 (n=12, Kōdō, coconut)
Integrity Post-Burn	No crack/warp, 10 cycles	Pass	No defects (ceramic/aluminum, Proto B)
Resin Adhesion	Bond stable at 220°C, 10 cycles	Pass	Pending (Proto B)
Airflow Efficiency	+4 min Gentle plateau vs. no support	Pass	Pending (Proto B, all coals)

Ring Stability	No tipping with 0.15 g payload, 10 cycles	Pass	Pending (Proto B)
Hole Clogging	No ash buildup, 10 cycles	Pass	Pending (Proto B)
Aroma Purity	4.3–4.5/5, Kōdō (0.3 mm, Kōdō coals), -30% PAH	Pass	Pending (Proto B)
Model-Specific Purity	4.0–4.4/5, Balanced/Majlis/Intense/Niche (4–13.5 mm, all coals)	Pass	Pending (Proto B)
Radial Heat Evenness	Upper/lower chip sides 220 ± 10°C, all models/coals	Pass	Pending (Proto B)
Vapor Release	~75–98% across models/coals	Pass	Pending (Proto B)

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10. Risk & Compliance Matrix

Risk	Mitigation	Standard
Finger Burn	Silicone tongs, QR-linked demo	ASTM F2058
Salt Off-Note	Pure-Lite SKU	N/A
Child Access	ISO 8317 foil	EN 862
Combustion CO	Ventilation warning	ISO 13571
Resin Bond Failure	Validate adhesion (Proto B)	N/A
Ring Stability	Test lips/payload (Proto B)	N/A
Hole Clogging	Validate ash isolation (Proto B)	N/A
Aluminum Heat	Warn users, use tongs (Proto B)	ASTM F2058
Aroma Impact	Validate all models/coals (Proto B)	N/A
Vapor Trapping	Test 3–12 mm borders for ~75–95% release (Proto B)	N/A

Model Confusion	Clear labeling/instructions per model/coal (Proto B)	N/A

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11. Prior-Art Log

No prior art (hookah, Kōdō, electric heaters) combines:

- Annular heat source (coconut, Kōdō, or self-igniting coals) with mica insert.
- Perforated dual-radius ceramic/aluminum ring with fixed mica depths (0.3–13.5 mm).
- Resin gluing (180–200°C) or pinned oud payload.
- Model-specific aroma optimization (Kōdō to intense).

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12. Manufacturing Snapshot (10k Units)

SKU	Process	COGS	Retail	Gross %
Gentle Ring (Coconut)	Briquette press	$0.16	$2.20	92%
Table Ring (Coconut)	Briquette press	$0.18	$2.50	93%
Arabic Ring (Coconut)	Briquette press	$0.20	$2.80	93%
Gentle Ring (Kōdō)	Hand-crafted/pressed	$0.30	$4.00	93%
Table Ring (Kōdō)	Hand-crafted/pressed	$0.35	$4.50	92%
Arabic Ring (Kōdō)	Hand-crafted/pressed	$0.40	$5.00	92%
Self-Igniting Cartridge (Small, 3-Pack)	Molding + blister	$0.95	$9.00	89%
Self-Igniting Ring (Large, Gentle)	Molding	$0.25	$3.00	92%
Self-Igniting Ring (Large, Table)	Molding	$0.30	$3.50	91%
Self-Igniting Ring (Large, Arabic)	Molding	$0.35	$4.00	91%
Heat-Plate Ring	Press + laser	$0.48	$5.50	91%

Suspension Ring (Ceramic, Kōdō, 0.3 mm)	Molding + glaze + drilling	$0.64	$10.00	90%
Suspension Ring (Ceramic, Balanced, 4 mm)	Molding + glaze + drilling + mica	$0.68	$10.00	89%
Suspension Ring (Ceramic, Majlis, 7.5 mm)	Molding + glaze + drilling + mica	$0.70	$10.00	89%
Suspension Ring (Ceramic, Intense, 11 mm)	Molding + glaze + drilling + mica	$0.72	$10.00	89%
Suspension Ring (Ceramic, Niche, 13.5 mm)	Molding + glaze + drilling + mica	$0.74	$10.00	89%
Suspension Ring (Aluminum, Alt.)	CNC + finish + drilling	$0.79	$10.00	89%

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13. Commercialization

- **Q3-2025**: Crowdfunding (U.S./UAE) for Kōdō Model (coconut/Kōdō coals), $10 retail, 90% margin.
- **Q4-2025**: Retail/OEM in Saudi Arabia (Majlis Model, self-igniting/coconut), UAE/GCC (Kōdō/Balanced, coconut/Kōdō), Russia (Majlis, self-igniting). Japan potential (Kōdō coals).
- **Spa Appeal**: 4.3–4.5/5 sensory score, eco-friendly (60% CO_2 reduction, coconut).
- **Investor Appeal**: Low COGS ($0.64–$0.74 ring, $0.16–$0.95 coals), scalable to expos (Intense/Niche Models).

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14. Legal Notice

This Rev-E supersedes prior versions. Publication on Archive.org (May 14, 2025) establishes prior art under 35 U.S.C. §102(b). The inventor intends to file PCT applications by **November 14, 2025**, targeting grace-period countries (U.S., Saudi Arabia, UAE, Oman, Bahrain, Qatar, Kuwait, Russia). Utility/design patents may be filed by May 14, 2026 (U.S.).
Urgent Actions:

- Verify Archive.org upload date (May 14, 2025, or earlier) and snapshots (URLs).
- Contact Archive.org **immediately** (9:16 PM PDT, May 14, 2025) to request removal (unlikely). Document efforts.

- File PCT/provisional application **today** with USPTO/WIPO for UAE, Oman, Bahrain, Qatar, Saudi Arabia, Russia, U.S., covering resin gluing, perforated dual-radius ring, model-specific mica depths (0.3–13.5 mm, 0.3–12 mm borders), and coal types (coconut, Kōdō, self-igniting). Contact a patent attorney **now**.
- File by **November 14, 2025** (Saudi Arabia, Russia, 6 months); by **May 14, 2026** (U.S., UAE, Oman, Bahrain, Qatar, Kuwait, 12 months). Prioritize UAE/Saudi via PCT; Kuwait needs direct filing.
- Validate Proto B (June 2025) for adhesion, stability, airflow, aroma (4.0–4.5/5), heat (220 ± 10°C), and vapor release (~75–98%) across coals/models.